What is claimed is:

1. A color image processing method comprising the steps of:

(a) sorting image pixels according to the color distance between the image pixels and a central pixel;

(b) grouping the sorted pixels into groups in which the difference in the intragroup color distance is minimum and the difference in the intergroup color difference is maximum; and

(c) performing filtering by replacing a central pixel value with a predetermined pixel value determined by pixel values of pixels in the groups.

2. The color image processing method according to claim 1, further comprising the step of defining a window having a predetermined size within an input color image, wherein the image pixels are pixels within the window.

3. The color image processing method according to claim 1, before the step (b), further comprising the step of removing pixels having a difference in color distance from the central pixel greater than or equal to a predetermined threshold, with respect to a predetermined number of pixels at the beginning and latter parts among the sorted pixels.

4. The color image processing method according to claim 3, wherein the predetermined number is less than or equal to L/2, in which L is a predetermined positive integer indicating the size of an L×L window.

5. The color image processing method according to claim 2, before the step (b), further comprising the step of removing pixels having a difference in color distance from the central pixel greater than or equal to a predetermined threshold, with respect to a predetermined number of pixels at the beginning and latter parts among the sorted pixels.

6. The color image processing method according to claim 1, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

7. The color image processing method according to claim 2, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

8. The color image processing method according to claim 3, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

9. The color image processing method according to claim 4, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

10. The color image processing method according to claim 5, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

11. The color image processing method according to claim 1, wherein the step (b) comprises the sub-steps of:

(b-1) setting a first group consisting of 0th through *(i-1)*th pixels, and a second group consisting of *i*th through *K*th pixels, wherein *i* is an integer from 0 through *K* and $K=L^2-1$;

(b-2) obtaining the respective averages of the color distance differences for pixels of the first and second groups by the following Expressions:

$$a_1(i) = \frac{1}{i}\sum_{j=0}^{i-1} d_j(n) \quad \text{and} \quad a_2(i) = \frac{1}{K+1-i}\sum_{j=i}^{K} d_j(n)$$

;

(b-3) obtaining the respective variances of the color distance differences for pixels of the first and second groups are obtained by the following Expressions:

$$S_1^2(i) = \sum_{j=0}^{i-1} \left| d_j(n) - a_1(i) \right|^2 \quad \text{and} \quad S_2^2(i) = \sum_{j=i}^{K} \left| d_j(n) - a_2(i) \right|^2 ;$$

(b-4) calculating a value *J(i)* by the following Expression, using the obtained average and variance:

$$J(i) = \frac{\left| a_1(i) - a_2(i) \right|^2}{s_1^2(i) + s_2^2(i)} ; \text{ and}$$

(b-5) obtaining the value of *i* which makes *J(i)* maximum by the following Expression:

$$m(n) = \arg_i \{ \max J(i) \}$$

and selecting pixels ranging from a pixel having a small color distance to a pixel having the obtained value of *i* to determine the same as a peer group P(n).

12. The color image processing method according to claim 11, after the step (b-5), further comprising the steps of:

selecting *i* pixels ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the peer group; and

performing color quantization by weighting the color vectors of the respective pixels by exp(-T(n)), wherein T(n) is the maximum color distance within the peer group.

13. The color image processing method according to claim 11, after the step (b-5), further comprising the steps of:

selecting *i* pixels ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the peer group; and

obtaining the average of T(n) values of the whole image and performing color quantization using a value obtained by multiplying the average with a predetermined constant as the number of clusters, wherein T(n) is the maximum color distance within the peer group.

14. The color image processing method according to claim 11, after the step (b-5), further comprising the steps of:

selecting pixels whose number corresponds to the size of the peer group, ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the peer group; and

weighting the color vectors of the respective pixels by exp(-T(n)), wherein T(n) is the maximum color distance within the peer group, and performing color quantization using a value obtained by multiplying the average of the T(n) values of the whole image with a predetermined constant as the number of clusters.

15. The color image processing method according to claim 11, wherein the step (c) includes replacing the central pixel $X_0(n)$ with a new pixel $X'_0(n)$ by the following Expression:

$$X'_0(m) = \frac{\sum_{i=0}^{m(n)-1} W_i \, p_i(n)}{\sum_{i=0}^{m(n)-1} W_i}$$

where $p_i(n)$ are the pixels constituting the peer group and W_i are predetermined weights corresponding to $p_i(n)$.

16. The color image processing method according to claim 1, wherein the step (c) includes replacing the color vector of the central pixel with an average weighted by a predetermined weight that is larger for a pixel closer to the central pixel and is smaller for a pixel distant from the central pixel.

17. The color image processing method according to claim 16, wherein the predetermined weight is a value determined by a standard Gaussian function.

18. The color image processing method according to claim 1, further comprising the step of performing color quantization by weighting the color vectors of the respective pixels by exp(-T(n)), wherein T(n) is the maximum color distance within one group.

19. A color image processing method comprising the steps of:

(a) receiving a color image frame and segmenting the same into a plurality of color images by a predetermined segmentation method;

(b) sorting image pixels according to the color distance between the image pixels and a central pixel, with respect to an image selected among the segmented color images;

(c) grouping the sorted pixels into groups in which the difference in the intragroup color distance is minimum and the difference in the intergroup color difference is maximum; and

(d) performing filtering by replacing a central pixel value with a predetermined pixel value determined by pixel values of pixels in the groups.

20. The color image processing method according to claim 19, before the step (b), further comprising the step of defining a window having a predetermined size within the selected color image, wherein the image pixels are pixels within the window.

21. The color image processing method according to claim 19, before the step (b), further comprising the step of removing pixels having a difference in the color distance from the central pixel greater than or equal to a predetermined threshold, with respect to a predetermined number of pixels at the beginning and latter parts among the sorted pixels.

22. The color image processing method according to claim 21, wherein the predetermined number is less than or equal to L/2, in which L is a predetermined positive integer indicating the size of an L×L window.

23. The color image processing method according to claim 19, before the step (b), further comprising the step of removing pixels having a difference in color distance from the central pixel greater than or equal to a predetermined threshold, with respect to a predetermined number of pixels at the beginning and latter parts among the sorted pixels.

24. The color image processing method according to claim 19, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

25. The color image processing method according to claim 20, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

26. The color image processing method according to claim 21, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

27. The color image processing method according to claim 22, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

28. The color image processing method according to claim 23, wherein the step (b) includes grouping the sorted pixels using a function based on a Fisher's discriminant estimation method.

29. The color image processing method according to claim 19, wherein the step (b) comprises the sub-steps of:

(b-1) setting a first group consisting of 0th through *(i-1)*th pixels, and a second group consisting of *i*th through *K*th pixels, wherein *i* is an integer from 0 through *K* and $K=L^2-1$;

(b-2) obtaining the respective averages of the color distance differences for pixels of the first and second groups by the following Expressions:

$$a_1(i)=\frac{1}{i}\sum_{j=0}^{i-1} d_j(n) \quad \text{and} \quad a_2(i)=\frac{1}{K+1-i}\sum_{j=i}^{K} d_j(n)$$

;

(b-3) obtaining the respective variances of the color distance differences for pixels of the first and second groups are obtained by the following Expressions:

$$S_1^2(i)=\sum_{j=0}^{i-1}\left|d_j(n)-a_1(i)\right|^2 \quad \text{and} \quad S_2^2(i)=\sum_{j=i}^{K}\left|d_j(n)-a_2(i)\right|^2$$

;

(b-4) calculating a value *J(i)* by the following Expression, using the obtained average and variance:

$$J(i)=\frac{\left|a_1(i)-a_2(i)\right|^2}{s_1^2(i)+s_2^2(i)}$$

; and

(b-5) obtaining the value of *i* which makes *J(i)* maximum by the following Expression:

$$m(n)=\arg_i\{\max J(i)\}$$

and selecting pixels ranging from a pixel having a small color distance to a pixel having the obtained value of *i* to be determined as a peer group P(n).

30. The color image processing method according to claim 19, wherein the step (c) includes replacing the color vector of the central pixel with an average weighted by a predetermined weight that is larger for a pixel closer to the central pixel and is smaller for a pixel distant from the central pixel.

31. The color image processing method according to claim 30, wherein the predetermined weight is a value determined by a standard Gaussian function.

32. The color image processing method according to claim 19, wherein the step (c) includes replacing the central pixel $X_0(n)$ with a new pixel $X'_0(n)$ by the following Expression:

$$X'_0(m) = \frac{\sum_{i=0}^{m(n)-1} W_i \, p_i(n)}{\sum_{i=0}^{m(n)-1} W_i}$$

where $p_i(n)$ are the pixels constituting the peer group and W_i are predetermined weights corresponding to $p_i(n)$.

33. The color image processing method according to claim 29, after the step (b-5), further comprising the steps of:

selecting *i* pixels ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the peer group; and

performing color quantization by weighting the color vectors of the respective pixels by exp(−T(n)), wherein T(n) is the maximum color distance within the peer group.

34. The color image processing method according to claim 29, after the step (b-5), further comprising the steps of:

selecting *i* pixels ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the peer group; and

obtaining the average of T(n) values of the whole image and performing color quantization using a value obtained by multiplying the average with a predetermined constant as the number of clusters.

35. The color image processing method according to claim 23, after the step (b-5), further comprising the steps of:

selecting pixels whose number corresponds to the size of the peer group, ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the peer group; and

weighting the color vectors of the respective pixels by exp(-T(n)), wherein T(n) is the maximum color distance within the peer group, and performing color quantization using a value obtained by multiplying the average of the T(n) values of the whole image with a predetermined constant as the number of clusters.

36. The color image processing method according to claim 32, after the step (b-5), further comprising the steps of:

selecting *i* pixels ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the peer group; and

obtaining the average of T(n) values of the whole image and performing color quantization using a value obtained by multiplying the average with a predetermined constant as the number of clusters.

37. The color image processing method according to claim 32, after the step (b-5), further comprising the steps of:

selecting *i* pixels ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the peer group; and

obtaining the average of T(n) values of the whole image and performing color quantization using a value obtained by multiplying the average with a predetermined constant as the number of clusters.

38. A color image processing method comprising the steps of:

(a) defining a window having a predetermined size within an input color image;

(b) selecting pixels having a color vector similar to that of the central pixel within the window and defining the selected pixels as a group; and

(c) performing filtering of blurring using only the pixels within the defined group.

39. A computer readable medium having program codes executable by a computer to perform a color image processing method, the method comprising the steps of:

(a) defining a window having a predetermined size within an input color image;

(b) sorting image pixels according to the color distance between the image pixels and a central pixel;

(c) grouping the sorted pixels into groups in which the difference in the intragroup color distance is minimum and the difference in the intergroup color difference is maximum; and

(d) performing filtering by replacing a central pixel value with a predetermined pixel value determined by pixel values of pixels in the groups.

40. The computer readable medium according to claim 39, wherein before the step (c), the color image processing method further comprises the step of removing pixels having a difference in the color distance from the central pixel greater than or equal to a predetermined threshold, with respect to a predetermined number of pixels at the beginning and latter parts among the sorted pixels.

41. The computer readable medium according to claim 39, wherein the color image processing method further comprises the steps of:

selecting *i* pixels ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the selected group; and

performing color quantization by weighting the color vectors of the respective pixels exp(-T(n)), wherein T(n) is the maximum color distance within the peer group.

42. The computer readable medium according to claim 39, wherein the color image processing method further comprises the steps of:

selecting *i* pixels ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the selected group; and

obtaining the average of T(n) values of the whole image and performing color quantization using a value obtained by multiplying the average with a predetermined constant as the number of clusters.

43. The computer readable medium according to claim 39, wherein the color image processing method further comprises the steps of:

selecting pixels whose number corresponds to the size of the peer group, ranging from the pixel having the minimum color distance among the pixels sorted according to the color distance from the central pixel and setting the largest value of the color distances of the selected pixels as the maximum color distance within the selected group; and

weighting the color vectors of the respective pixels by exp(-T(n)), wherein T(n) is the maximum color distance within the selected group, and performing color quantization using a value obtained by multiplying the average of the T(n) values of the whole image with a predetermined constant as the number of clusters.

44. The computer readable medium according to claim 39, wherein the color image processing method further comprises the step of receiving a color image frame and segmenting the same into a plurality of color images by a predetermined segmentation method, wherein the color image is an image selected from the plurality of color images.

45. A color image processing apparatus comprising:

sorting means for setting a window of a predetermined size within an input color image and sorting image pixels in the window according to the color distance between the image pixels and a central pixel;

grouping means for grouping the sorted pixels into groups in which the difference in the intragroup color distance is minimum and the difference in the intergroup color difference is maximum; and

filtering means for performing filtering by replacing a central pixel value with a predetermined pixel value determined by pixel values of pixels in the groups.

46. The color image processing apparatus according to claim 45, further comprising quantizing means for performing color quantization by weighting the color vectors of the respective pixels by exp(-T(n)), wherein T(n) is the maximum color distance within a group having the smallest difference in the color vector from the central pixel within the window.

47. The color image processing apparatus according to claim 45, further comprising quantizing means for obtaining the average of T(n) values of the whole image and performing color quantization using a value obtained by multiplying the average with a predetermined constant as the number of clusters, wherein T(n) is the maximum color distance within a group having the smallest difference in the color vector from the central pixel within the window.

48. The color image processing apparatus according to claim 45, further comprising quantizing means for weighting the color vectors of the respective pixels by exp(-T(n)), and performing color quantization using a value obtained by

multiplying the average of T(n) values of the whole image with a predetermined constant as the number of clusters, wherein T(n) is the maximum color distance within a group having the smallest difference in the color vector from the central pixel within the window.

49. The color image processing apparatus according to claim 45, further comprising impulse noise removing means for removing pixels having a difference in the color distance from the central pixel greater than or equal to a predetermined threshold, with respect to a predetermined number of pixels at the beginning and latter parts among the sorted pixels.

50. The color image processing apparatus according to claim 45, further comprising segmenting means for receiving a color image frame and segmenting the same into a plurality of color images by a predetermined segmentation method, wherein the color image is an image selected from the plurality of color images.